

## SECTION 114

### ASPHALT PAVEMENT HOT RECYCLING

#### 114.1 GENERAL

Asphalt pavement hot recycling shall consist of removing an existing asphalt pavement, sizing the removed materials, furnishing additional materials if required by the ENGINEER, mixing the materials with a recycling agent in either a dryer-drum or batch plant and placing the recycled asphalt mixture on the roadway or street.

#### 114.2 REFERENCES

##### 114.2.1 ASTM

D 70	D 1160
D 92	D 2170
D 244	

##### 114.2.2 AASHTO

T 48	T 202
T 201	T 240

##### 114.2.3 This publication:

SECTION 116  
SECTION 336

**114.3 REMOVAL AND SIZING OF EXISTING PAVEMENT:** The asphalt pavement removed for recycling shall be crushed and re-screened so that all the material removed from the roadway is prepared for recycling and a uniform mixture of all material is maintained. If determined by the ENGINEER the material removed from the roadway and placed in the stockpile is not uniform in nature, the CONTRACTOR shall blend the material in such a manner that it is uniform throughout the stockpile.

#### 114.4 MATERIAL

**114.4.1 RECYCLING AGENTS:** The recycling agent to be mixed with the removed pavement shall conform with Table 114.4.1.1, 114.4.1.2, and 114.4.1.3.

**114.4.2 VIRGIN AGGREGATE:** If a virgin aggregate is specified for blending with the removed asphalt pavement, it shall meet the requirements of aggregates for an asphalt concrete as described in Section 116. The gradation band to be used shall be as designated in the supplemental specifications.

#### 114.5 PROPORTIONING

A job-mix formula for the recycled asphaltic concrete mixture to be supplied

under this contract shall be determined by an approved testing laboratory from representative samples of graded aggregate produced and stockpiled and the reclaimed asphalt pavement stockpiled by the CONTRACTOR. Recycled asphaltic concrete material will not be mixed until the ENGINEER has received and approved the job-mix formula. The job-mix formula shall indicate the definite percentage of the reclaimed pavement and the virgin aggregate, the percentage of recycling agent, and the temperature of the completed mixture as it is to be discharged from the mixer.

#### 114.6 MIXING

The recycled asphalt mixture shall consist of the reclaimed asphalt, the virgin aggregate and a recycling agent. No mixing of these materials shall occur until a job-mix formula has been approved by the City of Albuquerque Materials Testing Laboratory. The recycled mixture can be mixed in either an asphalt batch-plant or a dryer-drum. The CONTRACTOR is to follow the recommendations of the manufacturer of the plant as to mixing procedure. The reclaimed asphalt and virgin aggregate are to be proportioned in the plant through the cold feed bins or to be blended in the stockpile. The CONTRACTOR is to submit to the ENGINEER, for his approval, an outline of the procedures to be used in mixing the asphalt concrete.

#### 114.7 PLACEMENT

The placement of the mixture will follow the requirements for the placement of asphalt concrete as described in Section 336.

#### 114.8 MEASUREMENT AND PAYMENT

Removal of the existing asphalt pavement will be paid for at the contract unit price per square yard. Payment will include removing and delivering the bituminous pavement materials to the plant, and crushing and stockpiling as required. The recycled bituminous pavement mixture will be paid for at the unit price per ton or square yard, with a separate item for the recycling agent which will be paid for at the unit price per ton.

TABLE 114.4.1.1

PROPOSED SPECIFICATIONS FOR HIGH FLASH RECYCLING AGENTS

Tests	AASHTO Test Method	Grade					
		H-1 Min.	H-1 Max.	H-2.5 Min.	H-5 Max.		
Original Material:							
Viscosity, 60°C (140°F), Poise	T-202	50	200	200	300	400	600
Viscosity, 135°C (275°F), CS	T-201	50	--	80	--	110	--
Flash Point, COC, F	T-48	450	--	450	--	450	--
RTFC Residue:	T-240*						
Weight Loss, %	T-240	--	1.0	--	1.0	--	1.0
Viscosity Ratio**	--	--	3.0	--	3.0	--	3.0

\*TFO may be used, but RTFC shall be the preferred method.

\*\*Viscosity Ratio =  $\frac{\text{RTFC Viscosity at 60°C (140°F)}}{\text{Original Viscosity at 60°C (140°F)}}$

TABLE 114.4.1.1.2

INTERIM SPECIFICATIONS FOR CYCLOGEN

PROPERTY	FUNCTION & PURPOSE	TEST METHOD	L*	M*	H*
Viscosity @ 140°F, CS	Asphalt viscosity adjustment in recycled mix	ASTM D 2170	80-500	1000-4000	5000-10000
Flash Point, COC, °F	Handling precaution	ASTM D 92	350 min.	350 min.	350 min.
Volatility, IBP, °F 2%, °F 5%, °F	Avoidance of air pollution and hardening by evaporation	ASTM D 1160, 10 mm	300 min. 375 min. 410 min.	300 min. 375 min. 410 min.	300 min. 375 min. 410 min.
Compatibility, N/P	Avoidance of syneresis		0.5 min.	0.5 min.	0.5 min.
Chemical Composition (N+A <sub>1</sub> )(P+A <sub>2</sub> )	Durability of asphalt in recycled mix	ASTM D 2006	0.2-1.2	0.2-1.2	0.2-1.2
Specific Gravity	Calculations	ASTM D 70	Report	Report	Report

Suitable pumping temperatures are the following: L = 115°F, M = 190°F, and H = 200°F

TABLE 114.4.1.3

INTERIM SPECIFICATIONS FOR EMULSIFIED CYCLOGEN  
Designated as LE, ME, and HE<sup>1</sup>

PROPERTY	FUNCTION & PURPOSE	TEST METHOD	SPECIFICATIONS
Viscosity @ 77°F, SFS	Ease of handling	ASTM D 244	15-85
Pumping Stability	Prevention of premature breaking	G.B. Method <sup>2</sup>	Pass
Emulsion Coarseness, percent	Optimal distribution	Sieve Test, ASTM D 244 (MOD) <sup>3</sup>	0.1 max.
Sensitivity to Fines, percent	Adequate mixing life	Cement Mixing, ASTM D 244	2.0 max.
Particle Charge	Preferential affinity to asphalt	ASTM D 244	Positive
Concentration of Oil Phase, percent	Assurance of oil content and calculations	ASTM D 244 (MOD) <sup>4</sup>	60 min.

<sup>1</sup>Oils used for emulsions must meet specifications listed in Table 1.

<sup>2</sup>Pumping stability is determined by charging 450 ml of emulsion into a one-liter beaker and circulating the emulsion through a gear pump (Roper 29 B22621) having 1/4" inlet and outlet. The emulsion passes if there is no significant oil separation after circulating ten minutes.

<sup>3</sup>Test procedure identical with ASTM D 244 except that distilled water shall be used in place of two percent sodium oleate solution.

<sup>4</sup>ASTM D 244 Evaporation Test for percent of residue is modified by heating 50 gram sample to 300°F until foaming ceases, then cooling immediately and calculating results.